Coarse-Grained Simulation of Microphase Separation : Roles of Hydrodynamics in Cylindrical Ordering(Poster session 1, New Frontiers in Colloidal Physics : A Bridge between Micro- and Macroscopic Concepts in Soft Matter)

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— Roles of Hydrodynamics in Cylindrical Ordering —

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ブロックコポリマーのミクロ相分離の静的特徴（相図など）に関しては，実験・理論・シミュレーションによってよく調べられている [1, 2] が，動的特徴についての研究はまだ十分ではなく，近年注目を集めている．我々は，ミクロ相分離構造形成キネティクスにおける流体力学的相互作用に着目し，無秩序–シリンダ相転移の数値シミュレーションを行った．その結果，流体管の不安定性に起因する流体力学効果がシリンダの配向秩序化を促進することが明らかになった．

Block copolymers form various mesoscopic structures (sphere, cylinder, lamella, etc.) depending on their block ratio and temperature. Although the static properties of microphase separation are now well understood [1, 2], the kinetic pathway of the ordering has not been fully understood yet and is a matter of active reaserch. We numerically investigate the kinetics of disorder-to-hexagonal transition, focusing on the roles of hydrodynamic interactions. We found that the hydrodynamic effects, especially hydrodynamic pumping (Siggia's mechanism [3]), change the kinetic pathway of cylindrical ordering and helps the formation of homogeneous hexagonal phase.

Figure 1: Snapshots of hexagonal ordering from disorder phase with (a) and without (b) hydrodynamic interaction.

References

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